Helping Continuation High School Student Become Successful in Mathematics

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Table of Contents

..... 1

Acknowledgements 2

Table of Contents 3

Abstract 5

Chapter 1 Introduction 6

Statement of Problem 7

Research Question 10

Theoretical Rationale 10

Assumptions 13

Background and Need 13

Chapter 2 Review of the Literature 15

Review of the Previous Literature 15

Student-Teacher Relationships 15

Student Competence 16

Student Engagement 20

Chapter 3 Method 38

Sample and Site 38

Ethical Standards 38

Access and Permissions 38

Data Gathering Strategies 39

Chapter 4 Findings 40

Data Analysis Approach 40

Interview with an Expert 40

Chapter 5 Discussion /Analysis 44

Summary of Major Findings 44

Implications for Future Research 45

References 46

Abstract

The focus of this research is to understand how to engage at risk students at a continuation high school in mastering mathematics. These students typically fail math classes, and, as a result, are unmotivated to attempt to learn principles of mathematics. The purpose of the study is to develop strategies that build their understanding of Algebra 1. The theoretical rationale that forms the basis of this paper addresses student engagement in learning. Teaching meaningful content serves as a link to connecting students with subject matter. A review of the literature and an interview with a mathematics consultant indicate that positive reinforcement, a variety of teaching strategies, a personal connection with students, and a sense of the part of the students that they belong to the school and/or community are important in engaging students in the study of mathematics.

Chapter 1 Introduction

I have been teaching at an alternative/continuation high school for the past four years. Now, it is only a continuation high school. I have had many students come to my classroom with hate in their eyes, hopeless body language, why did they sentence me to this class again, and I do not care about this or any class. The common denominator for these statements is Algebra I/Mathematics. I want to change these feelings, emotions, body languages, and words of my student's towards mathematics at my school.
I was a teacher at an alternative school and I have taught at a small and a large comprehensive high school. The large comprehensive high school is the main feeder school for the continuation high School where I work. I had students that did not like or hated mathematics at these institutions.

How can I change these attitudes towards mathematics? I thought that I should try to teach mathematics in the way young people are touched by information in their daily lives. They are hit every day with short text messages, quick emails, and internet blogs, television commercials that are short, explosive and leave a person wanting more information.

I need to become a math teacher that grabs student's attention, excites them, shares small dosages of information, pushes new math frontiers, and strengthens their old math frontiers. I want to constantly review mathematical concepts that have been established through a student's academic career. I also want to push forward in

mathematical concepts that my students have never been exposed to in school. I want expose, teach, and review mathematics to students.

Students have reported the following:

I have not been successful in math because I have to carry a huge math book, I do not, will not, can not, hate and I do not know how to study, I have to take a lot of notes, I stopped doing math when the alphabet became best friends with numbers, I am never going to use this in my life, my family and I have always struggled in mathematics, I can not add, subtract, or multiply unless I use my hands and sometimes toes, and the number one reason I do not do math is because "it sucks!"

As a teacher, I feel that I am able to temporarily fix these feelings or problems. I need to find solutions and become the solution for my student's mathematical dilemmas. I want students to be successful in my math class whether I teach at a comprehensive high school, alternative high school, or alternative/comprehensive high school.

Every school year I try to reinvent myself as a math teacher and I need to be a "Stone Age and 22nd Century Teacher" to deal with a "21st Century student." The emphasis here is that one needs to teach the fundamental part of mathematics, yet one needs to use engaging techniques.

Statement of Problem

Students had not and are not having success in Algebra I through traditional methods. My definition of student success means obtaining a letter grade of D or better, passing the math part of the California High School Exit Exam (CAHSEE), earning the maximum

units per grading period and their mathematics units for the graduation requirement in a timely manner. This also means that students are proficient in their understanding of Algebra I. Unsuccessful students are those earning 59% or below each grading period, not earning the maximum amount of units per grading period, and inability to retain or explain Algebra I concepts. These students do not try or attempt to learn Algebra I. By this statement I mean that students are absent, or they can be in class but do not demonstrate any effort to learn the concepts. They do not bring materials to pass the class, such as a pen, pencil, notebook, or backpack. They do not have proficient skills to pass the CAHSEE or state standardized tests.

Purpose Statement

The purpose of this study is to help me learn how to engage students in my classroom. Also I am exploring this topic to acquire new teaching techniques, listen and read about other math teacher's philosophies in teaching mathematics, and to better myself as an educator.

In addition, I need to figure out new ways, ideas, and frontiers to help my student's test scores improve from "far below basic" to "proficient or better." I need to increase our Annual Performance Index (API) score at my continuation high school. It continues to drop every year that I have taught at this institution. This is also the trend at the feeder comprehensive high school where my students transfer from throughout a school year.

I believe that I have bright, intelligent, and talented math students. The students have the abilities to achieve in higher math classes. They come to me discourged because of their past performance in mathematics. They do not have sufficient confidence in their own abilities to learn complex information.

I need to sharpen my teaching approach by becoming knowledgeable about mathematical theories, behavior and social theories, motivating skills and even more patience. I will not be able to cut the math barriers that my students have built over their time in school. Today's students are tough steelhead fish that are waiting to be caught and trapped intellectually. I better have the right lure, bait, or fly to trick, snag, hook and reel these beautiful yet dying people before my eyes fish.

Furthermore, I have the eminent CAHSEE and graduation unit requirements. Once my students pass the exit exam and meet graduation requirements, they drop out of mathematics completely. I want students to stay in my classes with energy, enthusiasm, and excitement to learn and obtain more mathematical concepts, as well as critical and analytical thinking skills. If I can change this trend of not being successful in mathematics, then I hope that there will be carry over towards the science, another unloved field for these students.

Finally, I am tired of hearing through the media that California students or students of the United States are performing in the field of mathematics below their peers throughout the United States or in other countries. I do not have much influence in the world of mathematics other than my little pond. But, I would sure love to turn it into the

most beautiful and colorful pond in the world with students that are striving to be more intelligent, aware, and productive citizens in society most importantly through mathematics.

Research Question

What are methods of teaching mathematics to engage students in learning Algebra 1?

Theoretical Rationale

Student Engagement Theory

Shernoff, D., Csikszentmihalyi, Schneider, and Shernoff, E. (2003) designed this study to focus on student engagement within the framework of flow theory, how students spend their time in high school classrooms, and the conditions which they become engaged in learning.

A conceptualization of student engagement is based on the culmination of concentration, interest, and enjoyment. Students increase engagement when the perceived challenge of the task and their own skills are high and in balance, the instruction was relevant and the learning environment was under their control. Students are more engaged in individual and group work versus listening to lectures, videos, and taking exams. To increase engagement, focus on teaching learning activities that insure students' autonomy and provide challenges for students' skills.

Flow theory engulfs students in their school activity, as an athlete or dancer focuses on their play or performance. Students perceive the activities as fun, pleasurable and worth

doing. In addition, the flow theory creates a bond between challenges and skills needed to have successes in school activities.

Students are disengaged due to the following reasons.

1. Attendance, failing classes, transition between schools, suspensions, and behavior issues contribute to disengagement and dropping out of school.
2. Boredom, alienation, and disconnection with a school or the school community triggers disengagement and dropping out of school.

Students spend the school day "goofing around" because they are disengaged and "goofing around" allows them to get through the school day.

Students are engaged due to many aspects.

1. Phenomenological factors of student engagement.
    a. Relevance of instruction- students are more likely engaged with authentic academic work relative to real life situations and intellectually beyond the classroom.
    b. Perceived control- students engage in school when they feel that they have control over their learning activities and positive emotions in their classroom environment.
2. Instructional and teacher factors of engagement.
    a. Teacher instruction- students are less engaged in teacher-controlled activities, such as lectures or whole group instruction.

   b. Student instruction- students engage in small group and individual instruction.
   c. In addition, tests and exams can cause disengagement because of student comparisons amongst the students in the class.

3. Demographic and learning history in regards to student engagement.
   a. Females tend to be more engaged in school than males.
   b. 6th and 8^{th} graders are more engaged in school than 10^{th} and 12^{th} graders.
   c. Students are more inclined or influenced to be engaged if they have experienced positive reinforcement, or rewarded or praised in their past school history.

In conclusion, this study identifies that students are spending a lot of class time listening to videos, lectures, and working on individual activities. Students are allowed only a small percentage of class time to have group discussion or interactions. In order to obtain classroom, school, and post-graduate goals of participation, belongingness, and identification with your classroom, school, and community, students need to be exposed to meaningful and energetic activities and allowed to show mastery of concepts consistently and throughout their school day. Students need to be positively reinforced, made in control of their learning environment, and given opportunities to expose individual interests and development levels. Students will have “buy in” to their school.

Assumptions

Every student can do math. I believe that the teacher can make the student successful in mathematics.

Background and Need

Matthews (2005) “No Child Left Behind” has brought renewed national attention to the existence of achievement gaps. The mathematics education community is being challenged to address achievement disparities in school mathematics. Teachers need to rethink “who” can learn and be successful in mathematics.

One theory is to approach mathematics as an engineer. Use the engineering activity model of learning to build, known as a process or design of solutions to address a problem. Whereas, scientists use a building to learn activity, known as a “why?” process, and through research and time come up with the answers.

The Engineering model consists of the following strategies.

1. Defining and articulating the problem.
2. Identifying the constraints.
3. Engineering a design which overcomes constraints.
4. Implementing the design and monitoring the process.

The key is to identify the constraints, and designs to overcome the constraints.

In past documents, Equity Messages were acknowledged, but no guides or processes were offered to rectify or tackle the situation.

In addressing the Equity Messages throughout the past thirty, teachers need to address "every child." Address students denied educational opportunities and students that have not been successful in math or school. Address minority students, female students, "at-risk" students, as well as the students that are the opposite of these students. Teachers need to make changes to help students achieve and be successful in mathematics.

1. Equitable assessment is a key to impacting the school mathematics outcomes.
2. Understand the "strengths and needs" of students from diverse backgrounds and ethnicities.
3. Don't make learning an "individual psychological process" but rather make it cultural and perhaps even social.
4. Come to understand the prior experiences and informed knowledge of students in order to connect them to mathematics learning.
5. Have the continuing challenge of questioning and reforming their existing pedagogy.

Teachers need to break away from status quo.

Chapter 2 Review of the Literature

Review of the Previous Literature

Student-Teacher Relationships

Jaworski and Potari (2009) studied a focus group of sophomores/10th graders in high school mathematics. The researchers believe that there are two relationships between students and teachers:

a) The student and teacher have interactions and cognitions, and they have associated issues determined from classroom dialogues(small talk and mathematical concepts/information shared). This is micro-analysis.
b) The student and teacher have classroom interactions and cognitions, and they have interactions on wider-systemic cultures(affects that their home environment and cultures put on school and learning through which learning is mediated). This is macro-analysis.

Teachers wanted to use this study to help improve their teaching. The university researchers wanted to study the teacher's engagements. They used transcribed notes, tape recordings and interviews of teachers and students to help the teachers with the macro-analysis which is to have students learn mathematics while focusing on social situations and concerns to help combat the micro-analysis. As a teacher, one needs to address the individuals learning methods and their social thoughts about learning math/school. Bring cognitive and interactions together.

Student Competence

Gresafali, Martin, Hand and Greeno (2009) examined two middle school mathematics classrooms and the construction of systems of competence. An individual's competence is an attribute of a person's participation in an activity system, such as a classroom. Competence is not seen as a trait of an individual, but rather an interaction between the opportunities that a student has to participate competently and the ways that individual takes up those opportunities.

The construction of competence is how students, teachers, math curriculum, math manipulatives, software tools, and the physical environment interact with each other to make an 'activity system.' These systems shape the way an individual is expected, entitled and obligated to participate.

This research focuses on how the ways that agency and accountability are distributed in the classroom. Traditionally and Fundamentally, competence is what students need to know or do in order to be "correct." Competence can also be taking "incorrect" solutions and sharing them with the class. This may and can push the thinking of the class.

An Activity System, such as the classroom, should not be defined by one member of the classroom. The teacher is usually the one member. The system needs to be dynamic, open, and a semiotic system of meaningful actions. In a classroom system, there are a range of behaviors. Accommodating and working with these behaviors and giving students "what they need to do in order to be successful." Place the students'

experiences at the center of the classroom discussion. Also these systems create conversations of what it means to be “proficient” in a math classroom. There are two points: what is meant by “proficient” in mathematics and how to support learners/students to become “proficient” in mathematics.

An individual’s agency is how one acts, contributes to the joint action of a group and the individual’s participation in the community. Personal actions can develop patterns and form an identity that the community or group become aware of. An individual can ‘always’ exercise agency, it is the nature of that exercise that differs from context to context. As an educator one must not look at how an individual acts, but look at how individuals are given opportunities to act or engage in one or more manners in a classroom activity.

An individual’s accountability is what students are supposed to know and who are they expected to convince. When students have to be accountable to their peers and the teacher and not just the teacher, students have to work more in order to convince their peers and teacher their solutions make sense. Therefore, students have more buy in and this approach allows students more opportunities to respond and revise solutions to questions or problems.

As the teacher do not set up conflicting competencies. If you set up a task and you afford students multiple paths for solutions, but you, as the teacher, are only looking for one particular solution path. It is ultimately harder for the students to determine what

is competent. Use the classroom as an example to think about how competence gets made meaningful through the actions of a community.

Keck-Staley (2010) explored the role of human resource capital and how it relates to Black and Latino students and how it builds their mathematics identities. When teaching Black and Latino students, you have to capitalize on their human resource capital and math identities. Also, learning math is a personal and social issue towards these cultures. Culturally relevant teaching must use students' cultures to engage them and carry them into math concepts. Make your classroom into a community where students are able to interact and help each other understand mathematics. Also it is a way for students to build confidence in math. They learn how to be part of a community and whether they want to be engaged in the community.

To motivate and engage students in mathematics, as well as build critical thinking and conceptual understandings of math:

1) a student must feel he or she is a participant in the class
2) the teacher must use a variety of teaching techniques
3) allow students to choose their own methods to solve problems mathematics
4) increase thinking by problem posing
5) provide rich, worthwhile, engaging mathematical activities
6) facilitate students' participation, mathematical dispositions, and sense of connections in mathematics

7) provide students of ethnical backgrounds an opportunity to try in high-level mathematics computation and challenging mathematics learning experiences

Black students need to be taught in a manner that allows social learning and collaboration. Their math identities are shaped socially, intrapersonally and through school and community contexts. They know it is an important instrument to help achieve their future goals. Allow students to communicate, relate math to their lives and do problem solving and experiential learning.

Latino students need to be taught through a direct instructional model. It means that teachers teach to the whole class, control discussion, and decision making. Teachers emphasize lecture, drill and practice, remediation and have a practice that constitutes a "pedagogy of poverty." This can help transition their lives and make math connections to their cultures and the world.

Utilize student's human resource capital(methods of thinking, social histories, practical skills of everyday living, one's knowledge, one's educational abilities, and one's self-efficacy and individual disposition and one's cultural styles and values). Engage students in mathematical investigations that have specific aspects to their social and physical world. Set up norms in your classroom and have an alignment between the practices and identities of home and school. This will have implications whether students engage for their goals.

Student Engagement

Williams and Ivey (2001) conducted a study of a single student in the eighth grade for a year. Looking at what makes the student engaged and motivated, and his or her affective assessment of mathematics.

Graham and Waiver (1996) ask the most fundamental question. How do we get children to "accept the basic premise that learning, schooling, and mastery of the material that adults prescribe are important?" Graham and Waiver (1996) define motivation simply as "the study of why people think and believe as they do."

Middleton and Spanias (1999) describe motivation as "reasons individuals have for behaving in a given manner in a given situation."

However, this study focuses on engagement in mathematics not achievement in mathematics. This is known as behavior of interest. Also, it looks at "cause" for behavior. This study also looks at behaviors related to engagement in classroom activities which are more universal versus achievement standards that vary from class to class or district to district. For example, a student was engaged and his demeanor changed when the teacher led the class in a conceptually oriented, open-ended discussions and activities.

This study uses Aristotle to help understand causes of human action. Aristotle has four causes: material, efficient, formal, and final.

a) A material cause is the substance that makes up a thing.

b) An efficient cause refers to the impetus in an event-the push, thrust, or flow that brings about an event.

c) Formal cause involves the patterns or organizations in the flow of events or the constitution of objects.

d) Final cause are those things for the sake of which something happens or comes about.

Two points come from Aristotle's definition: First, formal- cause understanding of patterns/rules of play could be extremely useful. Second, the study of human behavior and of motivation in particular, material and efficient causes have been privileged to the virtual exclusion of formal and final causes.

In the causality and motivational theory part of this study, it states that a teacher needs to look at variables of choice and persistence and look at cognitive operations and emotions as having effects on motivation, such as the anxiety of failure, feelings of control, casual ascriptions.

Graham and Weiner (1996) Motivation and Behavior are looked at like Math Formulas, Behavior = Drive x Habit. Do not look at motivational theories only as efficient and formal causality, but look at final causality.

Benpechut and Drago-Severson(1999) point out the need for motivational theories to lack more broadly at contextual and cultural factors and away from narrow, linear causal models.

Rychlak's (1988, 1994) Logical Learning Theory (LLT) is to establish a 'rigorous humanism,' that is, a psychological theory that combines rigor in scientific methods with humanistic constructs. Rychlak's humanism means theory that employs formal and final causes in explaining human behavior. Humans are able to reason dialectically as well as demonstratively. Humans are required to take a stand on issues confronting them. (LLT) comes from logical consequences flowing from choices of premises. We take a stand on the events, concepts, premises and actions that make our life meaningful, judging them at least to be positive or negative. From Rychlak, affection is a final cause both because (1) it has no cause in the sense of an underlying motivation, stimulus, trauma, social norm, or chemical trigger and (2) because it is a premise from which we subsequently extend meanings to situations in our life.

Ripski and Gregory (2009) studied 10th grade students and looked at the perception of the school environment both at the individual and school level. Unfairness, hostility, and victimization were used as predictors of teacher perceived student engagement and achievement in reading and math in the same year. Engagement has been shown to be an important component of academic resilience over and above background characteristics and high levels of engagement may explain the success of students at risk for academic failure. Also students' perceptions of their school climate has the potential to predict their engagement and achievement in school. Engagement can increase student academic success and is seen as a multi-dimensional construct including emotions, cognitions, and behaviors. Engagement is synonymous with

"Academic Enabler." Academic enablers allow students to be engaged, be motivated, get study skills, and get social skills. The enablers can either inhibit or enhance the impact of instruction on achievement. One's engagement behaviors fluctuate depending on one's current and past successes. The behaviors increase the chances of academic success and retention.

Behavioral engagement has two components:

1. Higher behavior engagement students are students that have had success in elementary, middle, and high school. It pushes a student to graduation. They participated in learning and academic tasks. They were involved with their school community, communal goals and didn't allow their personal demographics and socioeconomics inhibit their graduation goal or goals.
2. Lower behavior engagement students are students that disengage and exhibit withdrawn or disruptive behavior and have had low academic success or achievement. Elementary, middle, and high school have not been perceived by these students as a place of belonging or sharing and achieving the communal or school goals. They have not been involved in the school community because their demographics or socioeconomic status has not been linked towards high school graduation.

Once a student does not identify with a school or the student has an emotional withdrawal to the school. The student will be less likely to participate and motivate oneself. Thus, this leads to unsuccessful school outcomes and low academic success.

School climate has been conceptualized in many studies as the combined beliefs, values, and attitudes among principals, teachers, and students. People's environment serves as a determinant to one's behavior. If students feel or have the perception that a school has clear and fair rules, then the school will have less delinquent behavior and less student victimization. As a result, the school may have higher achievement and behavioral success, and less student drop outs. Students' behavior patterns develop as a result of numerous positive or negative interactions or experiences. Students' successes or failures within these episodes shape the patterns over time.

School climate has individual and school-level characteristics. Academic achievement, academic success, high rate of attendance, personal safety, less delinquent behavior, and student engagement will not happen if you allow students the following perceptions.

1. School-level characteristics- the school is impoverished, rules and regulations are not clear and defined, authority figures are inconsistent in rule enforcement, and your school size has an effect.
2. Individual characteristics- the student looks at socioeconomic status, gender, race, as a negative perception. The student has had negative interactions with teachers, peers, and school authority figures. The student has not felt safe due to alienation or delinquent peers.

The method used to investigate the relationship between students' perceptions of the school climate and student engagement and math achievement was a student survey. It

consisted of three scales- students' perceptions of hostility, students' perceptions of victimization, and students' perceptions of unfairness.

A teacher survey that addressed student engagement. Scores from the ELS: 2002 standardized tests, tests constructed by the Education Testing Service, were used to address academic achievement. In addition, they used student and school characteristics, such as socioeconomic status, gender, race, school size, and school poverty. 5% of the students surveyed were not included because they didn't fill out the majority of the items, and this was the same for teacher surveys.

The findings indicated that males had perceived higher levels of unfairness, hostility, and victimization compared to females. Non-whites and students of low socio-economic status perceived their school climate as hostile, more than white students. Larger schools and school poverty were correlated with perceived unfairness and hostility. When it came to teachers rating individual student engagement, student socioeconomic status, gender, and race were significant predictors of student engagement. Girls were engaged more than boys. Whites were engaged more than non-whites. If you take into account these demographic factors, individual perceptions of unfairness and victimization were significantly related to student engagement. In regards to the entire school, if the school climate had negative perceptions, then low engagement was associated with it. School size has an effect on school collective engagement.

Reading achievement was better for students that perceived the school as being more unfair than the students that thought the school was less unfair. Mathematics

achievement had boys scoring higher than girls. Like Reading achievement, the individual level of socioeconomic status, gender and race were significant predictors. School climate consisting of unfairness, hostility, and victimization were significant predictors.

In conclusion, school climate sends a powerful message to the individual of schools and the school itself. Be aware of hostility, victimization, and unfairness as a teacher, staff member, or administrator. Be conscious of how rules are derived and enforced. Be aware behavior is related to the favorable or unfavorable view of a school. Be aware, as a teacher, staff member, or administrator, positive or negative perceptions tell students if they are supported, safe, and can achieve success.

Smith and Gellar (2004) designed this study to help teachers with essential principles for teaching mathematics to students with disabilities and at-risk students. Students are failing because teachers lack or do not implement effective strategies to foster understanding basic concepts of Algebra. Teachers need to be more responsible and cognizant to their content, preparation, and instruction.

There are teaching attributes that have been recognized to help students in a positive and effective manner.

1. Teach concepts.
2. Make a connection with student's prior knowledge and current concepts.
3. Present information in a form of problem solving strategy that is relevant to the students.

4. Demonstrate word problems at Bruner's three levels(concrete, pictorial, and abstract).
5. Provide examples and non-examples of the concepts, as well as, correct and incorrect solutions.
6. Organize the information so students can see a visual representation of the concepts.
7. Provide guided practice with feedback on the problems they are working on.
8. Complete an error analysis of the student's work. Give verbal descriptions of students' strategies. Determine the approach to the next step in instruction.

In addition, teachers need to complete a task or check list when preparing lesson plans for teaching.

The checklist consists of the following when making lesson plans:

1. Identify the concept to teach. Discriminate and distinguish for the students the similarities and differences from one concept to another concept.
2. Provide the students with correct and incorrect examples of the concepts. Allow students to differentiate the critical pieces of a concept.
3. Determine prior knowledge. Establish what prior knowledge students need for the new or current concept. Re-teach what they know and establish the prior knowledge in advance of a concept if needed.
4. Develop word or story problems that connect to their personal lives and personal experiences.

5. When solving a word problem, the teacher needs to prepare three types of problem solving models- a concrete, a pictorial, and an abstract.
6. Give students the steps needed to solve an equation or problem.
7. Develop problems for guided instruction and immediate feedback.

It was not included in the checklist, but build vocabulary, establish properties, and develop keywords to the understanding of concepts.

After a teacher has been cognizant, responsible, and accountable towards making sure the attributes of enhancing a student's understanding of a concept or concepts are in the lesson plan. It is time to carry out the lesson plan and teach the concept or concepts. Use the following procedures to implement your lesson plan.

1. Make sure your students have mastered the list of prior knowledge.
2. Label and identify the concept(s) being taught to the students.
3. Define the concept or concepts plus keywords for the lesson.
4. Provide students with at least three relative and non-relative examples according to the new concept.
5. Demonstrate how to solve each example.
6. Demonstrate why the non-relative example(s) do not relate to the current concept(s).
7. Provide a second set of relative and non-relative examples to your students and have them organize and categorize the problems according to be a relative or a non-relative example.

8. Use Bruner's (1996) three levels of solving problems (word problems in particular) - concrete, pictorial, and abstract.
9. Provide students with a copy of the visual organizer. In addition, provide students with two more visual organizers using other examples.
10. Prior to setting students on their own. Do a guided practice. Have students verbalize the steps that are being demonstrated.
11. As the teacher, make a decision for independence or do another guided practice.
12. Evaluate your students. Use assessment tools when applicable.

In conclusion, general and special educators need to focus on teaching concepts versus procedures how to solve a problem or problems. Educators need to provide examples and non-examples relative to the new concept, and establish prior knowledge relative to the new concept. In addition, teachers give the students visual representation of how to solve a problem (the steps) and provide them with guided practice using verbal response. Finally, students will show mastery of the concept if they can verbalize and defend their solution, and can give their own example.

Belfanz and Byrnes (2006) conducted a study to close the achievement gaps in the middles school years of high poverty and minority-dominated schools in Philadelphia. The middle schools were using a Whole School Reform (WSR) approach that enables and constrains mathematics achievement gains in the middle grades of schools. The reforms used to close minority achievement gaps were strong instructional programs, increased teacher support and training, and enhanced school learning climates.

Students that are “catching up” and “not catching up” to the norm in the SAT-9 have discernable patterns and do not gain consistently and do not gain more in early or later years according to the data collected. However, behavior marks, attendance rates, effort in math class, and a highly effective homeroom are highly significant in affecting a student’s odds of “catching up.” Not one of these factors is far more predictive for “catching up.” The study showed these positive attributes helped students “catch up” to the norm in the SAT-9. If a student was in a high-gain homeroom, then he or she had a 37% difference in the probability of “catching up” versus a student that went through a no high-gain homeroom. If a student was present or attended school every day over the three to four years of middle school, he or she had a 20% difference in the probability of “catching up” versus a student that had an average rate of attendance at 60% or lower. If a student averaged behavior marks of excellent, then he or she had a 22% difference in the probability of “catching up” than a student that averaged behavior marks of unsatisfactory.

In the logistic regression analysis, it states clearly that students have an opportunity to learn and there are individual factors that enable and constrain the closing of the achievement gap in mathematics. Attendance, behavior, effort, and a solid homeroom all have equal value to students and teachers alike, as well as, do not isolate focuses on the classroom, the teacher, or the student. They are all of importance with equal value.

In conclusion, this study recommends students need to be exposed to the following to have a positive learning experience in the middle school grades.

1. Organizational reforms to create stronger student-teacher bonds.
2. Strong instructional programs and sustained and intensive teacher support to provide students with equal opportunity to be in high level classrooms every year.
3. Climate programs that reward positive behavior and have clear and consistent sanctions for negative behaviors.
4. String of good teachers and successful instructional experiences.
5. Promote and motivate to increase effort in classes, to increase school attendance, and to build confidence in academic classes.

These strategies need to be implemented simultaneously, continuously, and consistently. Each strategy is as important as the other. These strategies lead to success for middle school students, but nothing was truly defined on which strategy carried more weight. Teachers have much to learn and understand about this process.

Maccini and Gagnon (2006) designed this study to help general education teachers and special education teachers deliver instruction and make accommodations in mathematics for students with (LD) learning disabilities and (E/BD) emotional/behavioral disorders. There are two types of instructional practices in this article, empirically and recommended practices.

1. Empirically validated practices refer to research-based approaches to teaching math skills. These approaches include the following:
    a. Use of objects for conceptual understanding
    b. Peer or cross-age tutoring strategies

c. Organizational strategies for retention, such as cards of strategy steps and graphic organizers.

2. Recommended practices refer to special and general education textbooks recommending approaches to teaching math skills. These approaches include the following:

   a. Use of calculators
   b. Assignment modifications, such as adjusted workloads/assignments
   c. Increased time for activities and tests
   d. Visual cues

Students with special needs are required to participate in mandated, high-stake assessments that are tied to rigorous math standards. Assessment accommodations are necessary to help "level the playing field" for students of special needs. The assessment accommodations should be used to evaluate what a special needs student knows and to exemplify the abilities of a special needs student.

Assessment accommodations consist of the following adjustment.

a. Use of calculators
b. Setting of a classroom, such as seating accommodations
c. Timing and scheduling of a test. For example, give extended time and test at a high performing time of the day.
d. Presentation, such as color coding
e. Response, such as cue cards or strategy step cards

The only empirically validated accommodations have been timing and oral presentation. In addition, there have been no empirically-validated or recommended accommodations to help (LD) or (E/BD) students in mathematics. Also, there are no studies or research to indentify factors that may predict instructional practices and accommodations for (LD) and (E/BD) students in mathematics. These factors include the following about teachers in predicting the number of research-based instructional adaptations and assessment accommodations.

a. The number of years teaching
b. The teacher type, such as a general teacher vs. a special education teacher
c. The teacher's familiarity with the content
d. The special and general education math courses that the teacher took in school
e. The teacher's classroom variables, such as how many students need math assistance

In this study, they surveyed general education math teachers that teach students with (LD) and/or (E/BD) and special education teachers that teach math to students with (LD) and (E/BD) and/or collaborate with the general education math teachers.

General education math teachers had the following characteristics.

a. They taught math to students with (LD) and/or (E/BD).
b. They were 10 times more likely to have a secondary math credential.
c. They were twice as likely to teach Algebra 2 to special needs students.

d. In preparation to being a teacher, they were almost twice as likely to take general education methods courses.
e. They felt more prepared to teach general education students.

Special education math teachers had the following characteristics.

a. They taught math to students with (LD) and/or (E/BD).
b. They were 11 times more likely to teach special need children.
c. They were 20 times more likely to have special education credentials.
d. They typically taught general or basic math skills.
e. They were more than twice as likely to take special education methods courses.
f. They felt more prepared coming out of education courses to teach (LD) and/or (E/BD) students.

Instructional practices most frequently used when teaching basic skills and computational tasks.

Special Education Teachers: (Four most popular)

a. Calculators
b. Individualized instruction by the teacher
c. Extended time on assignments
d. Problems were read to students

Additional strategies were used and they included: additional practice, individualized attention by the aide, cue cards of strategies, graphic organizers, and reduced problems.

General Education Teachers:

a. Calculators
b. Extended time on assignments
c. Individualized instruction by the teachers
d. Peer or cross-age tutoring

Instructional Practices most frequently used when teaching multi-step problem solving tasks.

Special Education Teachers: (Four Most Popular)

a. Problems read to students
b. Individualized instruction by the teacher
c. Extended time on assignments
d. Calculators

Additional strategies were used and they include the following: reduced homework problems, additional practice, strategy steps on cards, concrete objects, and graphic organizers.

Assessment accommodations most frequently used for assessing basic skills and computational tasks.

Special Education Teachers: (Four Most Popular)

a. Calculators
b. Problems read to students
c. Reduced problems on the test
d. Extended time on tests

An additional strategy used: cue cards of strategy steps.

General Education Teachers:

a. Calculators
b. Extended time on tests
c. Problems read to student
d. Individualized attention given to student by classroom aide

Assessment accommodations most frequently used when assessing problem solving tasks.

Special Education Teachers: (Four Most Popular)

a. Extended time on tests
b. Problems read to students
c. Calculators
d. Reduced problems on test

General Education Teachers

a. Calculators
b. Extended time on tests
c. Problems read to students
d. Individualized attention given to student by the classroom aide

In conclusion, special education teachers were less familiar with secondary math knowledge than general educators. Both special and general educators take few methods courses that focus on teaching math to students with (LD) and/or (E/BD). Also special educators use more strategies when teaching or assessing than general educators.

However, there are similarities, such as extended time and calculators. Furthermore, educators, whether general or special, need to be taught methods of teaching to work with and for students with (LD) and (E/BD).

Chapter 3 Method

Introduction

This is a qualitative study using the interview approach.

Sample and Site

Only one person was selected for the purpose of this interview, a purposive sample. I was interested in interviewing a local expert in teaching mathematics.

Ethical Standards

This study adheres to the ethical standards for the treatment of human subjects in research as defined by the American Psychological Association (2009). Additionally, this research proposal was submitted to the Dominican University of California Institutional Review Board for the Protection of Human Subjects, approved, and assigned number 8283.

Access and Permissions

The person I selected for the interview is a consultant for my school district. I also attended his mathematical workshops in summer sessions. He is a math teacher at a state university in California and math coordinator for a county office of education.

Data Gathering Strategies

I obtained the data through a phone interview. My expert answered open ended questions where he shared his philosophies, his methodologies and strategies, and his passion for mathematics. I had him elaborate on his lesson plans and his methodologies to translate them to my research and apply them to my classroom. My expert was willing and is willing to share more information to engage, expose, and challenge students in mathematics.

Chapter 4 Findings

Data Analysis Approach

I reviewed the interview for common themes and key ideas. I was able to compare his ideas and themes to my literature to see if there were any parallels. I found that he shared common ideas and philosophies as the literature that I read.

Interview with an Expert

Mr. Gonzalez is a math consultant for East County Office of Education and a professor of mathematics at the East University. Mr. Gonzalez was asked five questions during the interview related to teaching mathematics.

What do you consider student success in your mathematics classroom?

Mr. Gonzalez considers student success in his mathematics classrooms to be the following:

1. Leaving high school with success in Algebra 2 or higher.
2. Leaving high school and being academically competitive for the college level.
3. Entering a California State University or Community College and being placed in a College Algebra course the student's first year.
4. Having been exposed to Algebra 2 or higher with a grade of C or higher.
5. Knowing how to graph "any" mathematical equation, be able to factor, and manipulate equations.
6. Knowing and understanding different methods to solve mathematical problems.

7. Making sense of mathematics

How do you engage or re-engage students that fight your philosophy, strategies, and teaching methods?

Mr. Gonzalez engages and re-engages students through the following methods:

1. Using honesty and directness in his teaching.
2. Making students believe that they can do mathematics.
3. Making personal connections with your students.
4. Giving students success and confidence because if they have success, then they will come to class and want to learn.
5. Expressing to students that math is not always engaging and sometimes you just have to work at solving the mathematical concepts.
6. Relying on your personality and your style of teaching and entertaining to get them to learn mathematics.
7. If students feel that they are learning something, then they will show up.

Discuss Interaction or connections that you make.

What are your approaches to building interactions and connections with your students?

Mr. Gonzalez approaches building interactions and connections with students through the following methods:

1. Focus on the math concepts that you are teaching.
2. Teach math content not projects.
3. Prepare your students for college level mathematics.

4. Stop teaching just how to do mathematics; teach the "why" of mathematics.
5. Make the students draw connections within mathematics.
6. Develop students' intuition and flexibility of thinking.

What mathematical concepts, lesson plans, or strategies do you consider successful or not successful? What are the signs to you as a teacher?

Mr. Gonzalez considers the following to be successful lesson plans and strategies.

1. Have a system and a structure to your lesson plans.
2. Show side by side comparisons in your lesson plans. Show students different methodologies on how to solve the same mathematical concept(s).
3. Have multiple algorithms (processes) in your lesson plans. For example, students use long division in elementary school and synthetic division in high school.
4. Make your lesson plans have the students think and focus on math.

What is your philosophy on every student can learn math?

Mr. Gonzalez believes the following that every student can learn math.

1. Absolutely!
2. 100% of your students can learn mathematics.
3. He was able to teach students that are hearing impaired (deaf) how to do mathematics. Use visuals and show side by side comparisons how to solve the mathematical concept(s).
4. He was able to teach visually impaired (blind) students how to solve matrices. Create a mental picture and focus on your concepts.

Chapter 5 Discussion /Analysis

Summary of Major Findings

As a mathematics teacher, I found, through my readings and my interview, teaching discoveries that will better me and other teachers as educators. I am making personal connections with my students, but I am not making mathematical connections with my students. I have to remember not to worry about "who" I am teaching, but to teach "everyone" in my classroom. I have to make personal and mathematical connections with my unsuccessful students, but I can not forget to connect with my successful students. I need to focus on teaching the concepts versus procedures how to solve problems. If a student feels that they are being treated with hostility, unfairness, or victimized, then I will have behavioral or delinquent problems in my class and the student will not be engaged academically. Also behavior, attendance, effort, solid homeroom, the teacher, the student, and the classroom are all of equal value and importance to success in the classroom. I need to focus on all these attributes to student success.

Limitations/Gaps in the Literature

The literature would serve educators better if they showed and shared teaching strategies, methodologies, and lesson plans that at-risk or low achievement students engage in learning. The literature shares great ideas for engagement and what triggers disengagement in a school community. The literature would better serve educators if

they gave side by side examples or cases of how they were able to engage vs. disengage students in the school community. List the negatives and positives under the cases.

Implications for Future Research

I would like to see studies or research on engagement not solely based on ethnicities, but I would like to see how to engage students that have common themes or backgrounds. What are strategies used to engage students that listen to rap music, rock and roll, or musical students? What are strategies that educators are using to engage members of gangs, or students that have been in juvenile hall? What are strategies that educators are using to engage athletes that think sports is the only way to be successful? Maybe, the research needs to be wholistic for all these groups. If an educator can research, devise a plan, and implement the strategies for all these groups to be high achievement, successful, engage in learning, and contribute in a positive manner to a school community, then I do not need to categorize.

References

Balfanz, R., & Byrnes, V. (2006). Closing the mathematics achievement gap in high-poverty middle schools: Enablers and constraints. *Journal of Education for Students Placed at Risk, 11*(2), 143-159. doi:10.1207/s15327671espr1102_2

Gresalfi, M., Martin, T., Hand, V., and Greeno, J. (2009). Constructing competence: an analysis of student participation in the activity systems of mathematics classrooms. *Educational Studies in Mathematics, 70, 49-70.* doi: 10.1007/s10649-008-9141-5

Jaworski, B., & Potari, D. (2009). Bridging the macro- and micro-divide: Using an activity theory model to capture sociocultural complexity in mathematics teaching and its development. *Educational Studies in Mathematics, 72*(2), 219-236. doi:10.1007/s10649-009-9190-4

Keck-Staley. Lavette, T. (2010). The role of human resource capital of black and latino middle schoolers' mathematical identities. *Negro Educational Review, 61*,1-4. Retrieved June 22, 2011 from http://findarticles.com/p/articles/mi_7668/is_201004/ai_n56825785/

Maccini, P., & Gagnon, J. C. (2006). Mathematics instructional practices and assessment accommodations special and general educators. *Exceptional Children, 72*(2), 217-234.

Matthews, L. E. (2005). Towards design of clarifying equity messages in mathematics reform. *High School Journal*, *88*(4), 46-58.

Ripski, M. B., & Gregory, A. (2009). Unfair, unsafe, and unwelcome: Do high school students' perceptions of unfairness, hostility, and victimization in school predict engagement and achievement? *Journal of School Violence*, *8*(4), 355-375. doi:10.1080/15388220903132755

Shernoff, D.J., & Csikszentmihalyi, M., &Schneider, B., & Shernoff, E.S. (2003). Student engagement in high school classrooms from the perspective of flow theory. School Psychology Quarterly, 18(2), 158-176

Smith, K. S., & Geller, C. (2004). Essential principles of effective mathematics instruction: Methods to reach all students. *Preventing School Failure, 48*(4), 22-29.

Williams, S. & Ivy, K. (2001). Affective assessment and mathematics classroom engagement: A case study. *Educational Studies in Mathematics, 47,* 75-100.